THE MAC Flyer

January 1985

Flying the C-21...page 16

THE MAC Flyer

For Greater Safety in MAC Air Operations

JANUARY 1985 | MACRP 127-5 | VOL XXXII NO. 1

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The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225-5101, or Autovon 638-3534. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes of address for subscription mailing should be sent to GPO. Give both old and new addresses, including zip codes. USAF Active and Air Reserve Forces units establish requirements for this magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. *The MAC Flyer* is published at an approximate ratio of one magazine for every five MAC aircrew members, and one for every twenty MAC Support personnel. Distribution X; OPR: HQ MAC/IGFE ISSN 0024-788X.

The Winner by Default

In the final quarter of each year, the editors of this renowned publication seek out special individuals willing and able to accept a challenge. More specifically, individuals inclined to quality writing with a light, easy style and a powerful message are sought for dynamic literary competition. Then, failing in this endeavor, January finds our editors seeking those individuals capable of recognizing any written word at least two out of three times (the same grueling test we editors have to pass to get this job). Let's listen in as one of *"TMF's best"* interviews another likely competitor.

"Me? I have no writing talent whatsoever," the interviewee said.

"How then," the perplexed periodical publisher inquired, "did you amass the impressive stockpile of trophies, plaques, and certificates for journalistic endeavors I see adorning your fence here in this alley?"

"Elementary, my dear lad," he began, demonstrating his inability to think creatively. "I merely ensure I meet the entry deadlines and competition rules for every writing contest I see. Usually, I am the only entrant, so I win. Simple enough, eh? Of course, my goal is to finally win something of real value, something I can really cherish forever."

"But I see you've already won a boat, a car, a condominium in Hawaii, a free ski winter at Vail...."

"No, I mean something *really* good, like a C.R. Terror designer T-shirt and a MAC Flying Safety Writing Contest winner's desk set or personalized wall plaque. This year it'll be a cinch."

Fear not (or is that naught?) fans. You can prevent this miserable wretch from succeeding in his goal to steal yet another award for his collection of apathy-inspired victories. All you have to do is quickly create a compendium on the subject of your choice. Then write, rewrite, edit, quality control and otherwise check your prose or poetry for literary quality and the required aviation safety/mishap prevention message. Then, when you're satisfied with your prize-winning entry, send it in to us at *TMF*. Let us send *you* the C.R. Terror T-shirt and one year's subscription to the *Flyer*. Don't cheat your grandchildren of the opportunity to hear the story of "how I won the priceless C.R. Terror T-shirt through *The MAC Flyer's* writing contest." Be sure your work meets the deadline and rules set forth below. You wouldn't want some slob to win just because he was the only one who entered, would you?

The Rules

The 1985 MAC Flying Safety Writing Contest is conducted according to MACR 900-3 and these rules. All entries must be original, unpublished and postmarked no later than 31 March 1985. Stories must be between 1,000 and 3,000 words long (about 6 to 14 double-spaced typed pages); poetry should be about 75 to 100 lines. Entries must contain an *aviation safety/mishap prevention message.* Manuscripts must be double-space typed and submitted in two copies. Identify entries by title only and attach a cover sheet showing the author's name, address, duty phone number and unit. Also, the cover sheet should contain a brief autobiography.

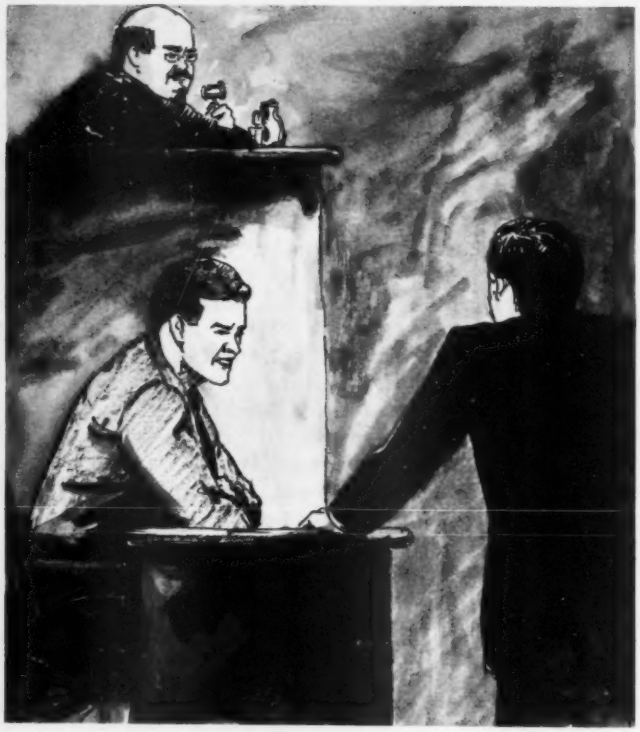
The contest is open to anyone. Entries qualifying under the above rules earn their author a free C.R. Terror T-shirt (so indicate your size) and a free 1-year subscription to *The MAC Flyer.* However, contest prizes (desk sets and plaques) may only be awarded to military members and civilian employees of the Department of the Air Force or Air Reserve Forces. Other entrants may be selected for Honorable Mention in a Special Category. All winning stories will be published in *The MAC Flyer.* Entries should be addressed to:

Safety Writing Contest
HQ MAC/IGFE
Scott AFB, IL 62225-5101

The one survivor had to answer for everyone on the crew...

How Do You Plead?

by SMSgt. James W. Swanson
USAF, Ret.



Prosecutor: Could you explain to the jury the events leading up to your arrival at Buenos Aires, Argentina?
Witness: Well, um, it was just a normal day. We departed Lima, Peru, about 0900. The other flight engineer was at the panel for take-off. The aircraft commander was getting an annual checkride and the wing commander spent most of the flight in the inboard aux seat reading and apparently catching up on some paperwork. We landed at Asuncion, Paraguay, and off-loaded some cargo. I took over the engineer's duties at that time for the flight to Buenos Aires.
Prosecutor: Did you refuel at Asuncion?
Witness: No. We had enough fuel on board to go to Buenos Aires. We just dropped off some cargo and picked up a mail bag or two.
Prosecutor: Continue, please.
Witness: Well, the departure was normal and it was a short flight to Ezeiza Airport. It was a nice clear day with hardly any wind on arrival at Buenos Aires. The landing was real smooth and professional. The pilot hardly had to use the thrust reversers.
Prosecutor: Why was that?
Witness: We were pretty light and we landed on the long runway.
Prosecutor: Which runway?
Witness: Runway two-nine.
Prosecutor: How long is runway two-nine?
Witness: Ten thousand, eight hundred twenty seven feet.
Prosecutor: Would you tell us what happened on the ground at Buenos Aires?
Witness: We taxied to the MAC terminal and shut down engines. The pilots and navigator went to base operations to file a flight plan to Rio De Janeiro while the loadmasters off-loaded the cargo. The other flight engineer and I checked the oil and went into the terminal for a soda while the loadmasters finished off- and on-loading the cargo. They only had one forklift, so we figured it would take awhile. During this time, we also tried to round up a maintenance stand to check out a wing blow-out door we had found open during the walk-around inspection.
Prosecutor: Where was the blow-out door located?
Witness: Between numbers three and four engines.
Prosecutor: What happened then?
Witness: Well, we killed some time waiting for the loadmasters to finish and we started to refuel the airplane. I guess we had been pumpin' on gas for about five or ten minutes with a truck that had what seemed like a

Honorable Mention, 1984 MAC Flying Safety Writing Contest

garden hose for a fuel hose, when the wing commander came over to tell me that we may have to fly an emergency med-evac mission. He asked me how long it would take to put a full fuel load onboard and get the aircraft ready to go. I told him that it would take quite awhile with the truck, but if we could get a fuel pit in front of the commercial terminal we could speed things up, but that we also had to repair a broken wing blow-out door. He asked me how long that would take and I...well...I said that I had some speed tape and it would only take a couple of minutes. I asked him if we were going to configure the aircraft here or at the patient pickup point. He said here. I also reminded him that we hadn't had lunch. If it was going to be a long day, we should eat something. He told me that he would try to get a fuel pit and try to round up some food. Ten minutes later he came back with sandwiches and sodas, and said to stop refueling. We then started engines and taxied to the fuel pit. The other flight engineer started to make out the takeoff data while we were refueling. When we finished, the pilots explained that our mission was to fly to Cordoba, Argentina, pick up someone who needed an emergency operation and fly him to Panama. Everyone helped each other out. The copilot and I helped the loadmasters reconfigure, while the other engineer completed his data and the aircraft commander and navigator refiled. The wing commander coordinated the mission with the embassy and medical personnel.

Prosecutor: Which runway did the other flight engineer compute the takeoff data on?

Witness: Runway two-nine.

Prosecutor: Who checked his data?

Witness: The copilot.

Prosecutor: Please continue.

Witness: When the embassy doctor arrived we were ready to go.

Prosecutor: Wait a minute. What about the blow-out door? Did you forget about it?

Witness: Sorry. No. The other engineer and I got the ladder and speed-taped the door closed.

Prosecutor: That's it? You didn't try to find out why the blow-out door opened?

Witness: It would have required taking the leading edge up, which is very time-consuming, especially if you don't have the proper tools. We just didn't have the time.

Prosecutor: Okay. After the doctor arrived, what happened?

Witness: We started the engines and taxied out. The pilot briefed the departure and the crew ran the checklists.

Prosecutor: Which runway did the pilot brief for departure?

Witness: Runway two-nine.

Prosecutor: Were there any problems with the airplane during taxi-out?

Witness: No, I don't think s...wait...well... not a real problem. Number four engine bleed valve didn't want to close when the air conditioning system was checked. The engineer had to rotate the master air conditioning switch and cycle the bleed valve switch open and closed a number of times to get it to close.

Prosecutor: Is that normal?

Witness: Well, yes and no. If the system is working properly, then you shouldn't have to do that. But, it's a frequent problem with this airplane, so it's done that way pretty often.

Prosecutor: What happened next?

Witness: The tower called us and asked if we wanted a departure on runway two-three. The pilot accepted, since it was a shorter distance to taxi and the winds were calm anyway. We taxied to runway two-three, the pilot briefed the departure and we were given an immediate takeoff clearance. The...

Prosecutor: What is the length of runway two-three?

Witness: Seven thousand, two hundred eighteen feet, sir.

Prosecutor: Was the takeoff data recomputed for the shorter runway?

Witness: No.

Prosecutor: Was the takeoff data based on takeoff rated power or reduced power?

Witness: Reduced power.

Prosecutor: What happened then?

Witness: The pilot in the left seat was making the takeoff. The examiner was in the jump seat. During takeoff roll the right wing pylon and air conditioning overheat light came on. The flight engineer called "reject." The pilot pulled all four throttles back and into reverse thrust, deployed the spoilers and got on the brakes. The end of the runway was coming up mighty fast. Somebody yelled, "We're not going to make it." The airplane started shaking. I heard this terrible scraping sound. The

noise was deafening...That's all I can remember. I'm sorry...so...

Prosecutor: That's okay. Take your time. Do you remember what speed the reject was called at?

Witness: No, sir. I couldn't see the airspeed indicator where I was sitting.

Prosecutor: Did anybody use the word "go"?

Witness: Not that I can remember.

Prosecutor: How long was the overheat light on before the engineer called "reject?"

Witness: I guess a couple of seconds. It's hard to tell for sure.

Prosecutor: I'm sorry that we had to put you through this ordeal. I have no further questions. You're excused.

Judge: Counsel, you may call your next witness.

Counsel: I have no more witnesses, Your Honor.

Judge: Mr. Prosecutor, do you wish to call any more witnesses?

Prosecutor: No, Your Honor.

Judge: Are you both prepared to deliver your summaries?

Counsel: Yes, Your Honor.

Prosecutor: Yes I am, Your Honor.

Judge: You may proceed.

Counsel: Thank you, Your Honor. Ladies and gentlemen of the jury. This has been a terrible and tragic accident caused as much by the concern to save the life of one person as by the errors of the crewmembers themselves. The anxiety created by the situation caused the mistakes to be made. Possibly, the pressure of wanting to look good in front of the wing commander added to it. The flight evaluation could possibly have made the pilot a bit tense, to the point of missing something as obvious as the need for new takeoff data. These points, coupled with mechanical problems, created the accident. The crewmembers can't pay for their mistakes anymore. With the death of all crewmembers, except the scanner, who is paralyzed from the waist down for the rest of his life, what can be gained from a finding of "guilty"? I ask, on behalf of the crewmembers' families for a dismissal of this case. Thank you.

Prosecutor: Ladies and gentlemen of the jury, first, let's find out what really caused the accident. The anxiety of the situation certainly aided in the downfall. What caused the blow-out door to come open in the first place? Taping it over without inspection could possibly be permissable, provided the air was taken away from that wing after engine start. It wasn't. When the bleed valve didn't close properly, did an alarm sound in the flight engineer's head? Would it close automatically in the event of an overheat? If the problem of bleed valves sticking is commonplace, is the problem being written up? All three pilots, the flight engineer and possibly the scanner should have caught the takeoff data problem. What is the new critical field length? Is refusal speed still good? In rebuttal to the esteemed defense counsel, the pressure to "do good" in front of the wing commander and flight examiner is not a very strong excuse. If a crewmember develops the professional habits required of his profession, the "doing good" would become second nature. Learning to control anxieties is a prerequisite to becoming a professional at any job. Yes, the crew did pay the ultimate price for their mistakes. I'm not asking you for a finding of guilt or innocence. I am, however, asking for this to serve as an example in hope that we might prevent a similar type of accident. Ladies and gentlemen of the jury, let your conscience be your guide. Thank you.

SMSgt. James W. Swanson

"Cleared for the Approach!"

Remembering these two simple rules can help cut through the rhetoric of approach clearances.

by First Officer Allen Schwab
Pan American World Airways,
Miami, Florida

Following a recent requalification session in the simulator, the examiner asked me several questions about various approach clearances. His questions triggered questions from me—and his answers were more than a little surprising.

As it turns out, we professionals may be more than a little lazy in relating published instrument approach procedures with actual ATC-authorized clearance directives. Apparently examiners willing to tackle this laziness are facing higher and higher failure rates. "Wouldn't hurt to write something on this subject, Al," my examiner suggested.

It *would* hurt to simply delineate the "rules of the road" yet again. The object is to entice the pros into reading, remembering and applying those procedures in the real world. Indeed, the application of the procedures is the key. And the best way to understand this relationship is by example—or rather by five examples.

But before we get to those, a brief review of the "rules" (as given in the Airman's Information Manual) is in order. Hang on, here we go.

"When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, shall, in addition to complying with the minimum altitude for IFR operations (FAR 91.119), maintain his last assigned altitude unless a different altitude is assigned by ATC, or until the aircraft is established on a segment of a published route or instrument approach procedure (IAP). After the aircraft is so established, published altitudes apply to descent within each succeeding route or approach segment unless a different altitude is assigned by ATC."

There's more. "Notwithstanding this pilot responsibility, for aircraft operating on unpublished routes or while being radar vectored, ATC will, except when conducting a radar approach, issue an IFR approach clearance only after the aircraft is established on a segment of a published route or IAP, or assigned an altitude to maintain until the aircraft is established on a segment of a published route or IAP."

Nothing like the official verbiage for keeping things simple. Looking at the preceding two paragraphs and expecting a ready understanding is asking *too* much.

I've developed a more simplified version of these procedures in the hope that they will be more readily applied. Welcome to a couple of Al's Timely Tips (ATT):

ATT 1. For the pilot—When being radar vectored or operating on an unpublished route, maintain your last assigned altitude until established on a published segment (route) of the IAP for which a minimum altitude is published.

ATT 2. For ATC—Issue an IFR approach clearance with an altitude to be maintained until the aircraft is established on a published segment (route) of the IAP, or wait until the aircraft is established on a published route before issuing the approach clearance.

Practical Application.

For the "how to" in applying these tips let's examine the following situations:

Situation 1. In this first example take your position as illustrated in Figure 1. Your clearance: "Proceed direct to the PBI VOR, cleared for the VOR Rwy 9L approach." Your last assigned altitude was 4,000 ft MSL. You are to proceed from your present position direct to the PBI VOR and execute the procedure turn as depicted. When may you start your descent from your present altitude of 4,000 ft?

Applying the rule outlined in ATT 1, you must maintain 4,000 ft until reaching the PBI VOR. At that time you may descend to 1,600 ft and complete your procedure turn.

***(Editor's Note:**—The exact wording in AFM 51-37, para 6-11e is: "Descend from the procedure turn fix altitude—published or assigned—when the aircraft is outbound abeam the procedure turn fix.")* If you can't determine "abeam" the fix, once established on the PBI 281 radial inbound (and within 10 nm) you may continue the descent to the step-down fix altitude of 600 ft, etc. In this situation, the procedure turn is considered a published segment of the IAP.

What about the published minimum safe altitude (MSA) of 2,600 ft? Couldn't you descend to 2,600 ft prior to reaching the VOR?

The answer is *no*, because the MSA does not constitute a segment of a published route. MSAs are published for emergency use only on approach procedure charts using facilities that provide azimuth information such as NDBs and VORs. The altitude shown does provide at least 1,000 ft of obstruction clearance within 25 nm of the facility defining the MSA. Nevertheless, navigational course guidance is not assured at the MSA and MSAs are not part of any published route or segment of the IAP.

Situation 2. Now take your position as illustrated in Figure 2 with the following clearance: "Intercept the HUB 16 DME arc, descend and maintain 5,000 ft, cleared for the VOR DME 1 Rwy 31L." Assuming your present altitude of 7,000 ft, you may now descend to 5,000 ft. But when may you descend below 5,000 and how low may you go?

Referring to Figure 2 and applying the same principles of "published segment," you may descend to 2,200 ft once you're established on the HUB 16 DME arc. ***(Editor's Note**—AFM 51-37, para 6-7: "An arc or radial altitude restriction only applies while established on that segment of the approach to which the altitude restriction applies. Once a lead point is reached and a turn to the next segment is initiated, the pilot may descend to the next applicable altitude restriction.")* Since the procedure turn is neither authorized nor required (NoPT) when using the arc to transition to the intermediate and final approach segments, you may descend from 2,200 ft to 1,200 ft after intercepting the HUB 136 radial inbound.

Situation 3. Let's look at still another situation which may seem confusing. Refer to your position as shown in Figure 3 with this clearance: "Maintain 6,000 ft, proceed direct to the MEM VOR, cleared for the Localizer Only Rwy 36R." What does your flight profile look like?

Look closely at the approach as depicted. From MEM you are to fly to ELVIS (TS), execute the procedure turn and complete the approach (without glideslope) to LOC only (GS out) minimums. You may descend to 3,000 ft upon reaching MEM since course guidance, altitude and distance are depicted from MEM to TS. That constitutes a segment of a published route. Passing TS you are to execute the procedure turn and intercept the localizer inbound, all at 3,000 ft. Passing GINIE you may descend to 1,900 ft and complete the approach as published.

What about descending to 1,900 ft after passing MEM? Unless ATC specifically assigns that altitude, you're stuck with the published minimum altitude of 3,000 ft for that segment of your flight.

Situation 4. You're over PUT (Figure 4) and you're "cleared via BRELD for the ILS Rwy 24." Your present altitude is 10,000 ft. In this situation, you must follow a terminal route and apply the same principles of published segment as previously illustrated. The "note" tells you that from PUT it's 16.8 nm on the PUT 302 radial to BRELD and the minimum altitude for this segment is 3,000 ft. Therefore you may descend to 3,000 ft once you're on that radial.

From BRELD you are to continue on the PUT 302 radial (another 12.6 nm) until intercepting the localizer at KIBBE. Once established on the localizer course inbound, you may descend to 2,200 ft and complete the approach. Notice again that the NoPT on the BRELD to KIBBE segment indicates the procedure turn is not to be flown.

Situation 5. Now suppose you're being radar vectored to intercept the localizer for Rwy 36 at DCA. Your position is as indicated in Figure 5. Your clearance: "Descend and maintain 1,700 ft until intercepting the localizer, you're cleared for the ILS Rwy 36." Does it appear ATC may have goofed in assigning 1,700 ft when you're still outside 10 miles from DCA, not to mention the published MSA for your position of 2,600 ft? The answer: Minimum Vectoring Altitudes (MVAs).

MVAs are established for ATC when radar

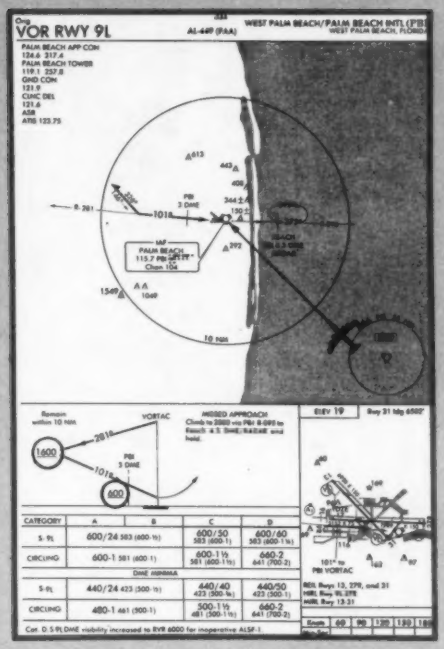


Figure 1—Although cleared to the VOR for the approach, you cannot descend to the MSA of 2,600 feet because its not considered a part of any published route or segment of the IAP.

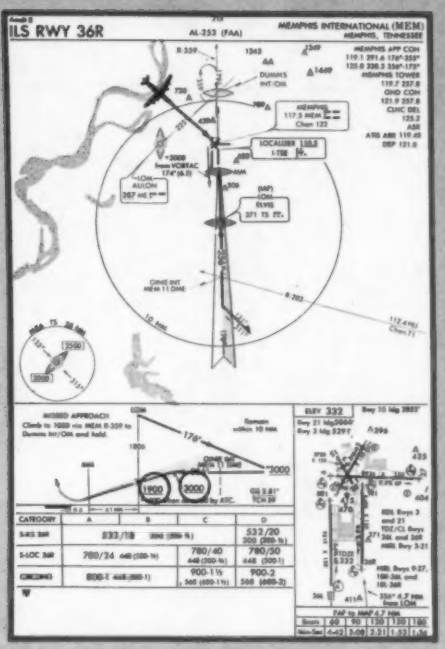


Figure 3—If cleared direct to MEM for the LOC only Rwy 36R, be sure to note the terminal routing depicted from MEM to TS.

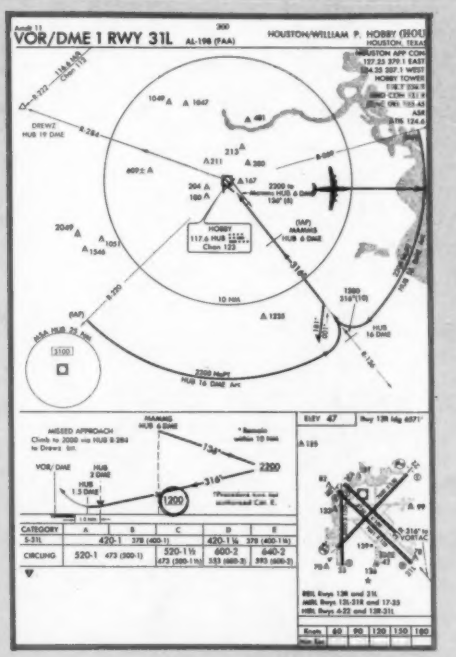


Figure 2—The arc constitutes a published segment with a minimum altitude of 2,200 feet.

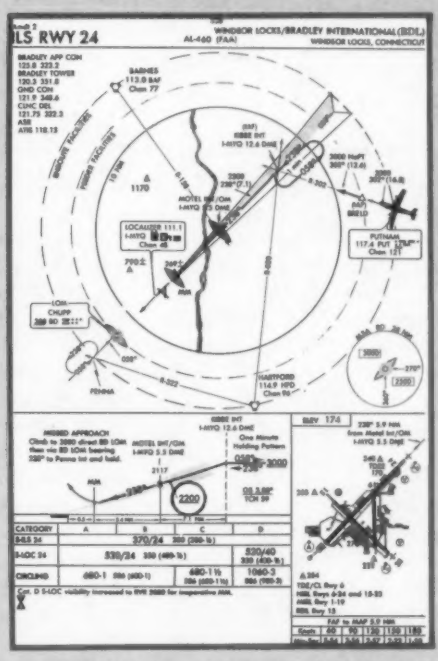
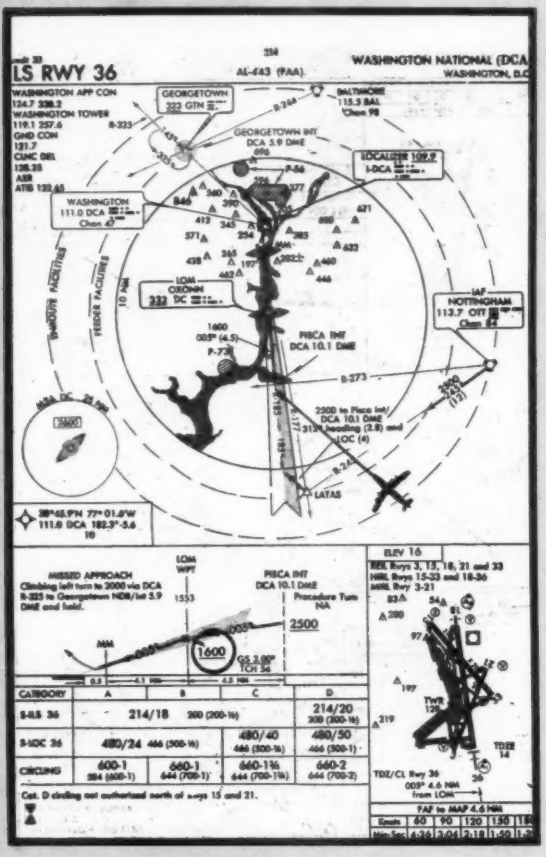


Figure 4—The depictions of distance and minimum altitude are quite helpful when flying a longer terminal routing.

Figure 5—Note the minimum FAF or glideslope intercept altitude of 1,600 feet.



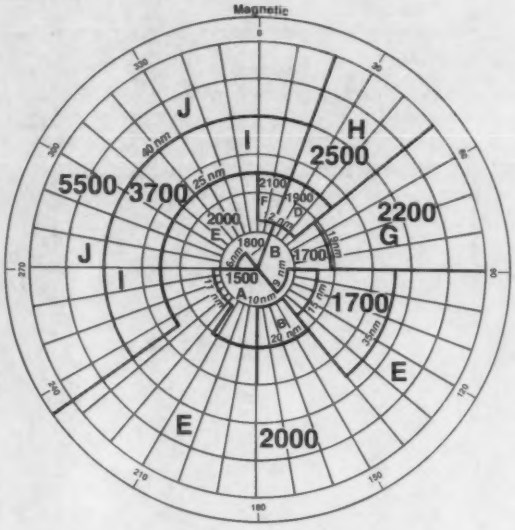
is used for traffic control. An MVA chart (Figure 6) is prepared by an air traffic control facility for its use only; it is not usually published for the pilot. Each MVA chart has sectors large enough to accommodate vectoring of aircraft within the section at that MVA. However, controllers are human, too, and are subject to mistakes. Constant awareness of your position to the surrounding terrain is critical!

To avoid a large sector with an excessively high MVA due to an isolated obstruction, the obstruction may be enclosed in a buffer area whose boundaries are at least 3 miles from the obstruction. Because of differences in the areas considered for MVAs and those applied to other minimum altitudes, and the ability to isolate specific obstacles, some MVAs may be lower than the nonradar Minimum Enroute Altitudes (MEAs), Minimum Obstruction Clearance Altitudes (MOCAs) or other published minimum altitudes.

Under no circumstances should ATC issue an IFR approach altitude clearance that is below the published final approach fix (FAF) minimum altitude. This is about the only check the pilot can make without specifically asking ATC what the MVA is for a particular sector, or referring to an appropriate chart depicting surrounding terrain.

By no means am I implying that the pilot should hesitate to question ATC concerning any altitude assignment which seems especially inconsistent with published altitude restrictions. Rather I am emphasizing the

Figure 6—Minimum Vectoring Altitude (MVA) chart for Washington National Airport. Though MVA charts normally cover the area within 30-nm radius of the tower, this one covers 60 nm.



pilot's ultimate responsibility for the safety of the flight.

Oh yes, there's also an Al's Timely Tip 3: If you're not sure of the exact meaning of any approach clearance, *ask for clarification*. Knowing and flying the "rules of the road" is the only way to keep the control of the airborne situation where it ultimately belongs—in the cockpit.

—Reprinted from *Professional Pilot*

Stress, Fatigue and the Crewmember

Medical studies have established that emotional stress created during the day-to-day lives of people can lead to ulcers, heart disease, family difficulties, loss of productivity and early death! So, stress must be a concern to crewmembers. Associated with stress is the more familiar problem of fatigue. The available evidence suggests operators and supervisors don't always focus sufficiently on these two problem areas. Yet, there are often clear indications or symptoms that an individual is, or is likely to be, exposed to risks arising from stress or fatigue, or both.

Stress

Research analysts have produced a "life event scale" which shows the relative score values of each stressor (stress-inducing events. See the accompanying table.) By being aware of the relative impact of these events, we should be able to guard against loading up ourselves or our workmates when stresses from "life events" already exist.

Apart from life events, there are other fairly identifiable symptoms of stress which we should be able to recognize in ourselves and others:

- general irritability or depression
- low morale—loss of enthusiasm
- poor work habits associated with a
- decline in the quality of work trembling, nervous twitches, or tics
- insomnia, sweating, headaches
- compulsive eating or drinking
- drug and alcohol abuse
- illness, such as ulcers, high blood pressure.

It's important to recognize the crucial role management can play in creating or alleviating stress. There is considerable evidence from physicians and clinical psychologists that psychologically unhealthy relationships between subordinates and their authority figures can lead to emotional disability.

One of the best ways to alleviate stress in the working environment, therefore, is to tasks, purposes, and goals. The way supervisors handle evaluations, internal job changes, tasking and counselling can be either devastating or morale boosting. Admittedly, there are times when tight deadlines and operational requirements induce stress, but such stress is to be expected and can be managed by careful assignment of tasks according to ability and equitability of the workload. The question of managing stress is succinctly addressed in the following quotation:

> "The secret of success is not to avoid stress and thereby endure an uneventful boring life, for then our wealth would do us no good, but to learn to use our capital wisely, to get maximal satisfaction at the lowest price."

Fatigue

Perhaps a more widely recognized enemy of crewmembers is aircrew fatigue. Flying tasks can require a high degree of skill, alertness and coordination, sometimes under adverse conditions. Often it's necessary to complete the most important and demanding part of a task at the end of a long and difficult day.

The fatigue factor, simply put, results in an inability to perform effectively. Also, it is insidious because an individual may not be aware that judgment has been impaired. The symptoms, however, are apparent to the rested observer and include the following:

- a low tolerance for frustration
- degraded coordination
- slowness in response
- failure to recognize errors
- carelessness
- acceptance of low standards of accuracy.

How many of us have committed or heard of errors such as improperly set altimeters, missed altitude calls, incorrect headings, and poor approaches followed by dicey landings after a long and difficult day? Fortunately, such errors are usually countered by our ability to draw on reserve energy to "psyche up" and handle a stressful situation.

It's necessary to be aware of circadian

rhythms, which explain the way in which the human body functions on a 24-hour-cycle biological clock. Any disruption of this cycle will cause fatigue and stress. Primary body functions such as temperature, blood pressure, blood sugar level and hemoglobin level can be adversely affected. Studies show that our poorest performance occurs at the low point in our circadian rhythm or the time we would normally be sleeping. Hence, our worst period is from about 0300 to 0600 local time. If you are trying to land during that period, especially after a long crew-duty day,

Life Event	Value
Death of spouse	100
Divorce	73
Marital separation	65
Jail term	63
Personal injury or illness	53
Marriage	50
Retirement	45
Change to different line of work	36
Trouble with in-laws	29
Trouble with boss	23
Change in work conditions	20
Change in sleeping habits	16
Change in eating habits	15

then don't expect your judgment and skills to be at their absolute best. Such matters as previously inadequate crew rest and crossing time zones will lower performance even more.

Crewmembers must also be aware of the phenomenon of "sleep deficiencies." The amount of sleep required by an individual varies, but in intensive flying operations, sleep disruption occurs frequently, to the point that insufficient sleep (sleep deficit) occurs. If less than eight hours of quality sleep is obtained in any 24-hour period, then an accumulation of sleep loss begins. The nature of flying operations is such that rest periods can become fragmented, with sleep often being scheduled for unusual hours. In these circumstances, it is likely that a crewmember's sleep deficit will accumulate to a point where task risk increases. Once an individual is into a sleep deficit situation, considerable time off is required to restore the body to its normal state. Studies have shown that, following duty times of 12 to 20 hours, fatigue may exist for one or two *days*.

There are a multitude of other factors which cause aircrew fatigue in addition to those mentioned. Some of these are: age, experience level, cockpit temperature, humidity, cabin altitude, and physical fitness, including the effects of caffeine, self-medication, alcohol, and smoking. There are a few irrefutable facts worth keeping in mind when considering pushing the fitness and hygiene factors and bending such rules as "bottle to throttle." Included in these are the following:

- Mental alertness and stamina are increased when an individual is physically fit;
- If crewmembers don't eat properly before and during a flight, a low blood sugar supply may result in anxiety, disorientation, amnesia, and headaches;
- Studies and reports show that smokers are more susceptible to fatigue and suffer from definite reduction in altitude tolerance;
- Alcohol causes significant changes in the body system that in turn seriously impair the performance of flying skills. These changes appear to remain longer after drinking stops than was previously realized. Alcohol itself and its residual effects can remain for up to 18 hours after drinking;
- The over-use (4-5 cups per day) of coffee after flight might impair adequate rest and contribute to unnecessary fatigue on the next day's flight. Of course, many of these fatigue and stress factors can be present simultaneously.

Comment

The subject of crewmember stress and fatigue is complex and there is often a struggle to maintain control over events which may pose a threat to safe operations. Nevertheless, crewmembers—pilots, navigators, engineers, loadmasters, flight mechanics, etc.—and managers must continue to focus on these human factors if their operations are to remain effective and safe. The idea is not to eliminate stress and be overly lenient, but more to alleviate unnecessary stress and fatigue. Those individuals associated with flight operations, either actively or administratively, must educate themselves on the many aspects of stress and fatigue that heretofore haven't been sufficiently emphasized. The best counter to the issue is to be able to recognize stress and fatigue-inducing factors and their associated symptoms early and to take action before distress becomes a problem.

—Reprinted from *Aviation Safety Digest*

The Odyssey of Zeppelin L-59

An account of the world's first strategic airlift.

by Mr. Thomas P. Ofcansky
Hq AFCC Historical Office
Scott AFB, Illinois

One of the little known episodes of strategic airlift history occurred in the tough East African bush during the waning months of World War I. For approximately three years, a hard-pressed German guerilla force, led by Major (later General) Paul von Lettow-Vorbeck, had managed to hold out against a well-equipped, well-trained, 250,000-man British army in the border areas of what is today Kenya and Tanzania. By the latter half of 1917, however, the military situation had deteriorated considerably. Cut off from the outside world by a British naval blockade, the Germans were short of weapons, ammo, medicine, and uniforms. Doctors had resorted to using bank-note paper for bandages and compresses. The German guerillas were forced to eat wild animals, including hippos and elephants, just to stay alive. And there had been no news from home for years!

With time running out, German Colonial Office and Admiralty officials decided to mount a relief expedition with a 743-foot long, specially constructed zeppelin, the L-57. According to engineering estimates of the day, the craft—which had a still-air range of 4,350 miles—could easily cover the 3,600 miles from Jamboli, Bulgaria (the southernmost German-controlled base) to Mahenge, German East Africa. At a cruise airspeed of 40 miles per hour, it would take *108 hours*—four and a half days!

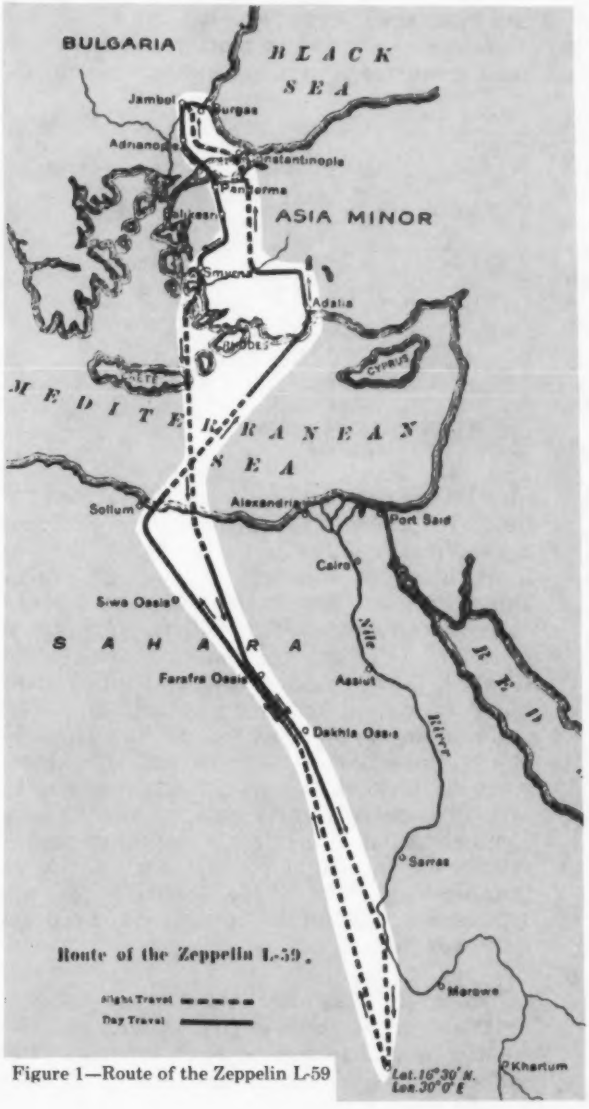


Figure 1—Route of the Zeppelin L-59

Unfortunately, L-57 never reached East Africa because its crew and commander violated strict safety procedures. See if any of these "violations" sound familiar.

First of all, Kapitanleutnant Ludwig Buckholt had hoped to impress his superiors by not delaying the project, so he ignored several bad weather reports and ordered the airship aloft for a full-speed test flight. All went well until just before landing. A sudden squall picked the zeppelin up, slammed it into the ground, and ruined most of the cable car's struts. Additionally, rudder and elevator controls, ballast wires and engine telegraphs were damaged beyond repair.

Somehow, the crew managed to nurse the L-57 down for a second landing. Again, the wind intensified and blew the craft across the field. To prevent it from becoming airborne, Buckholt valved gas and ordered his men to shoot holes in the tops of the gas cells. These actions caused the rear gondola to collapse and the 743-foot hull to pivot on the starboard midships gondola. In a matter of seconds, L-57 exploded and burst into flames fed by hydrogen, fuel, and ammunition!

Total flight time	95 hrs. 10 mins.
Distance flown	4,200 miles
Maximum altitude	9,850 feet
Average speed	44 mph
Complement	22 men
Fuel carried	47,800 lbs.
Fuel consumed	25,050 lbs.
Oil carried	3,360 lbs.
Oil consumed	1,107 lbs.
Hydrogen used	930,000 cu. ft.
Ballast carried	20,200 lbs.
Cargo and bombs	35,800 lbs.

Zeppelin commanders must have been a scarce commodity, for instead of reprimanding Buckholt for his lackadaisical safety attitude, the Admiralty ordered him to take command of another airship and make preparations for the flight to East Africa. By 25 October—less than three weeks after the explosion which had destroyed L-57—zeppelin L-59 was ready.

To give maximum assistance to von Lettow's army, the airship would be dismantled and cannibalized upon landing. The balloon envelope would be converted into tents, while its muslin lining would be torn into bandages. Gas bags would become sleeping bags and a wireless tower would be built from the duralumin framework. The engineers even covered the catwalks with enough leather to satisfy von Lettow's boot requirements!

After more bad weather and technical problems, Buckholt—along with a twenty-two man crew—managed to depart Jamboli on the morning of 21 November 1917. By evening, L-59 was in the vicinity of eastern Crete. Again, the weather deteriorated quickly and a violent storm buffeted the giant airship. The top lookout panicked and reported the craft had caught fire from a lightning strike. Actually, L-59 had encountered St. Elmo's fire. But Buckholt had finally learned a lesson about the weather. Throughout the duration of the storm, which lasted several hours, he kept L-59's fragile radio antenna wound in, thus cutting himself off from the outside world.

Otherwise, he would have learned the 21 November takeoff had come too late. British forces in East Africa had discovered the existence of the airlift plan and were anxiously awaiting the airship's appearance. According to Lord Cranworth, a lieutenant in the East African Mounted Rifles, "More than once I was awakened that night to decode immensely long cypher dispatches as to the necessary steps to take on (L-59's) approach." To make matters worse for the Germans, General Jacobus Van Deventer, commander-in-chief of the British East African Expeditionary Force, ordered his Royal Flying Corps squadron to full alert in anticipation of destroying the zeppelin before it landed.

Apart from the British threat, the German war machine in East Africa was on the verge of total collapse. Indeed, on 20 November the Colonial Office in Berlin had intercepted several messages in which the British had claimed victory over von Lettow. The next morning, further communications brought news of serious German reverses in the Makonde Highlands. Because of his safety precautions with the fragile radio antenna, though, Buckholt was unaware of these developments.

The airship therefore continued across the Mediterranean and, at 0515 the next morning, finally reached the African continent at Ras Bulair, near Mersa Matruh, Egypt. As the

zeppelin flew over the Libyan desert, the infernal heat quickly raised the gas temperature, forcing precious quantities to vent overboard through automatic valves. To prevent further gas loss, Buckholt ordered L-59 to fly nose down with an extra 1,650-pound load aft to counteract its nose heaviness. Turbulent heatwaves rising from the desert floor also impeded the craft's progress by repeatedly tossing it about, causing many crewmembers to become airsick. In addition, some of the men complained of severe headaches, which undoubtedly were brought on from staring too long at the blinding reflections off the sand.

Late that afternoon, the forward engine's reduction-gear housing cracked. Although the crew made emergency repairs, the engine wasn't used again for fear of another malfunction. Since that particular engine powered the radio generator, the airship could no longer send messages, though it could still receive them. The other four engines lasted until the end of the flight, largely because each one was shut down for up to two hours in every eight to prevent stress.

At 2145, L-59 reached the Nile River at Wadi Halfa, in northern Sudan. As it continued south, Buckholt dropped more than two tons of ballast, believing he could carry the rest of the load dynamically, flying 4° nose-up with the four remaining engines all operating. As the zeppelin entered the Nile valley, the temperature at altitude rose 11° C in less than five hours. By 1500 the next day, the airship could no longer be flown dynamically. The L-59 descended from 3,100 feet to 1,300 feet, losing its large antenna and nearly crashing into a mountain peak. To regain some of the lost altitude, the crew jettisoned more than three tons of ballast and ammunition.

The end of the mission occurred at 0045 on 23 November when Buckholt received a faint radio communication from the powerful overseas radio station at Nauen, near Berlin:

"Last foothold of Lettow-Vorbeck, Revala, lost. All Makonde Highlands in possession of British. Parts of Lettow's army captured. Rest in north in bad position. Return immediately."

About two hours later, L-59 reversed course for the flight back to Europe. In a day and a half, Buckholt, his crew and L-59 had covered 1,865 miles!

During the return to Jamboli, the pressures of the past few days started to affect the crew's performance. Some of the men became overly fatigued, while others contracted a debilitating fever of unknown origins. A few could no longer eat the airship's rations—self-heating canned food, preserved ham and sausage, and bread and butter—and became dizzy with hunger.

Despite the crew's deteriorating condition, L-59 continued on course and schedule. At 0330 on 24 November, the zeppelin left the African continent behind and headed straight toward yet another menacing bank of Mediterranean thunderstorms. After safely passing through it, Buckholt set a northeast course for the Gulf of Adalia on Turkey's southern coast. Sometime during the night, when the airship was over the mountains north of Ushak in Asia Minor, an emergency similar to the one in the Sudan threatened to end the flight.

As the temperature cooled during the evening, Buckholt again ignored safety procedures and failed to release ballast. With the nose up at a 5° or 6° angle and all engines running at full power, a wind gust struck the airship causing it to drop precipitously. After more than three tons of ballast had been dumped, the zeppelin returned to its proper cruising altitude.

Just after dawn on 25 November, the L-59 landed at Jamboli. After climbing down, the crewmembers—tired, cold, and stiff from their ordeal—stumbled and staggered around for a few moments until they became accustomed to being on solid ground. Despite the fact they had failed to achieve their mission, the crew had a right to be proud. They had remained aloft for 95 hours—nearly four days—and still had enough fuel for two or three days of additional flying! The L-59 also flew approximately 4,200 miles nonstop, an airlift record that lasted until the advent of today's modern in-flight refuelable jet airlifters. It should be pointed out, however, that if Buckholt had followed proper safety procedures in the first place, the earlier L-57 mission might have succeeded in reaching Lettow-Vorbeck's army, and could have at least prolonged the German guerillas' ability to fight in East Africa.

Flying the C-21

Mucho power plus great avionics equals one efficient people-mover!

Photo courtesy Gates-Learjet

As airplanes go, only a few can be referred to as sexy. After all, and without trying to outdo Tom Wolfe, "real airplanes" aren't supposed to be sexy. The C-5—a real airplane—isn't sexy. "Old Shaky" was a man's airplane, and hardly anyone would refer to it as "sexy." Within the past few months, however, a new aircraft has entered MAC's inventory which threatens to destroy our best definition of "real airplanes." Ladies and

by Capt. Byron L. Howard
Associate Editor

gentlemen, the C-21—Gates-Learjet Model 35—is a real airplane, and sexy to boot!

Of course, I didn't know this until I got a chance to fly in one recently. Operating from Scott AFB, Illinois, the 1401st Military Airlift Squadron was the first CT-39 unit to switch from the venerable Sabreliner to the Model 35 Learjet under a lease/option-to-purchase plan. (See *TMF*, January 1984, p.16.) To season some of the unit's less experienced pilots, the detachment occasionally operates a "route trainer." This allows two pilots, under the watchful eye of an instructor, to transit both familiar and unfamiliar bases, shooting a variety of approaches to gain experience and perfect their procedures and techniques.

One Saturday morning, I met Capt. Matt Ligocki, an IP with the 1401st MAS, at Scott base operations along with Capt. Tim Garvin and 1st Lt. Steve McAllister. Together, we would be taking a brand new C-21, tail number 0071, from Scott to Barksdale AFB, Louisiana, to NAS New Orleans. From New Orleans, we'd fly non-stop to Norton AFB, California, RON, and return to Scott on Sunday.

First Impressions

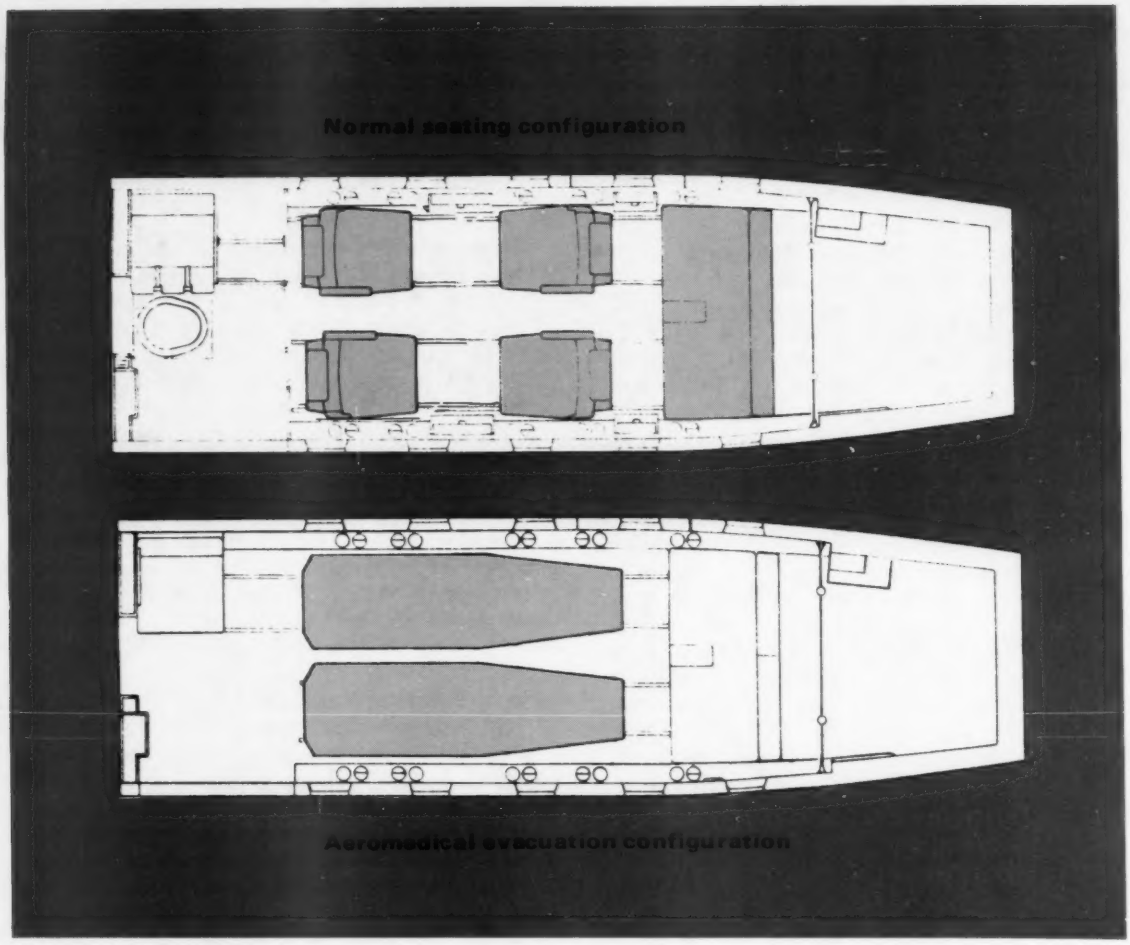
When I arrived, the three pilots had already figured out the route of flight, checked the NOTAMS and weather, and filed the flight plan. We then walked out to the flight line. As I approached the Learjet for my first really close "look-see," I was struck by the size difference between the C-21 and the old '39. The Lear sits closer to the ground, for a start. So much so, in fact, that you can look straight into the cockpit without even standing on tiptoe. The passenger/crew entrance door is a two-section affair, and you're inside with only one short step. But don't try to stand up! Your best bet to avoid a bump on the head is to do a reasonable imitation of Quasimodo as you "walk" to your seat. But the configuration will look familiar to anyone who's ever flown on the Sabreliner. There is one forward-facing and one rear-facing seat on each side of the aisle, and a forward-facing divan spanning the width of the aisle behind those. The baggage is stowed behind the couch or divan or whatever you choose to call it. In fact, the C-21 can actually haul more baggage and people (a total of eight in a pinch) than the Sabreliner —hard to believe. In spite of the close quarters, this is a really comfortable plane for the pax! Again, though, the overall visual impact of this plane tells you it was not only designed to *look* fast, but to *go* fast as well, adding weight to the old adage, "if it looks right, it will fly right."

Flight Planning Made Easy

Although we didn't have much time before takeoff, I was able to watch the cockpit checks from the jump seat. For those "old heads" out there who grew up in the C-141s, C-130s, and C-5s, I'm afraid you're in for a little bit of a culture shock when you first fire up the Lear's systems. First of all, the old flight director you grew up with has been supplanted with something called an "EHSI." If I said that it was nothing more than an "electronic" HSI, I'd be fibbing. Besides being a multi-colored cathode ray tube (CRT), the Collins HSI will display not only a compass card like the old analog style, but will also display the aircraft's course, heading, ground-speed and other bits of information *digitally*.

Just to the pilot's right is a Sperry Primus 300 SL multi-colored radar display that also displays course, waypoints *and* weather—a handy tool for visualizing just where your next storm-avoidance maneuver will take you. In the center of the cockpit is the nav/comm gear—digital display, of course—and heads-up to keep the leans to a minimum if you're in the soup.

But perhaps the most striking piece of electronic gear on the C-21 is the UNS-1 "Integrated Flight Management System." This



C-21A Interior Arrangements

device is able to give you more information than you could possibly use in the course of a single flight. For starters, the IFMS searches the data base to determine which DME stations are within range (approximately 350 nm). The nav computer then sequentially tunes the DME transmitter/receiver to each DME station within range. By interrogating multiple DME stations, knowing the geographic coordinates of each, and then correcting the distance computation for slant range using the DME transmitter's elevation and aircraft altitude, the navigation computer calculates the aircraft's position in latitude and longitude, as well as figuring groundspeed! The UNS-1 can also give you real-time specific range, vertical navigation computations, plus complete digital interfacing to the EFIS (that's electronic flight information system) and autopilot. Oh, yes, the UNS-1 also keeps up its position by processing signals from Omega and VLF nav stations around the world!

To pull out some information straight from the C-21 Dash-One, the FMS uses a self-contained, world-wide Jeppesen data base permanently stored to provide the system with information on approximately *6,600* locations! The system also has the capacity to store up to 200 pilot-defined locations and 100 pilot-defined routes. There may be up to 98 waypoints on each of those 100 routes, but the total number of route waypoints can't exceed 750.

"We still do all of our flight planning manually," remarked Captain Ligocki, "but

it's really easier to come out to the airplane and use the UNS to flight plan."

In fact, the only 100-percent pure military gear aboard the Learjet is the UHF radio, the single TACAN, and the IFF/SIF transponder. In addition to all those other "nice-to-have" gizmos, the C-21 has a voice recorder, flight data recorder, and an altitude alert. For one last stab at all you "other" crewmembers out there, the ADF is digital, as is the King HF radio! Sigh!

Light the Fires!

Once we finally reached the active runway, I settled back for takeoff. I was still thinking CT-39 takeoff. What I got was more like a T-38 takeoff. Once Captain Ligocki released the brakes, the distance-remaining markers became a blur. The Lear's impressive acceleration forces you back into your seat!

Climb-out to our cruise altitude of FL390 didn't take very long at all. Captains Ligocki and Garvin followed the recommended climb schedule of 250 knots to .7 Mach, and then .7 to level-off. Normal cruise is .77 between FL390 and FL410 to get the most "mpg." The Model 35's maximum certified ceiling is FL450.

On our way to Barksdale, I received a graphic demonstration of the high-altitude capability of the C-21. We were cleared for a "block" altitude of FL410-430, and once there, Captain Ligocki rolled the Lear into a 30° bank. There was no sign of any instability, no high-speed buffet—nothing. A 45° bank back the other way was equally ho-hum. In other words, it is a good high-altitude machine, something the CT-39 wasn't.

After the usual transition work that comes with training—ILS, VOR, TACAN, and single-engine operations—we departed the Barksdale traffic area and continued on to NAS New Orleans where we loaded up with gas and headed for Norton. But even though it was a 3½-hour flight, there was still plenty for the pilots to do up front.

"We're still learning about the airplane, it is so new," added Lieutenant McAllister, who had switched seats with Captain Garvin. "It only takes about two months to learn how to fly it well, but it takes about twice that long to learn the avionics and get the most from them."

Once we arrived at Norton, we taxied to parking near that detachment's CT-39s. Transient alert was waiting with our requested fuel load, but first, Captains Ligocki and Garvin had to conduct a little "on-the-job training" for the refueling crew. Like most MAC bases, the transient maintenance crew had never seen a Learjet, and refueling a C-21 *is* different. Unlike a normal military aircraft designed to take single-point refueling, the Model 35 is refueled over the tip tanks, albeit a little slower than transient crews are used to. Again, though, and owing to the still-new feeling that goes along with such an aircraft, the transient refueling crew was most eager to learn and they did the job right.

But How Does It Fly?

I suppose the term "pilot's airplane" is trite and wears a little thin, but the C-21 *is* very much a pilot's machine. It handles easily but honestly at high altitudes, though it is a bit sensitive in the roll axis during approach and landing. The things that impressed me were the same things that impress most people who fly the C-21—power, shorter time-to-climb to altitudes, state-of-the-art avionics, and economy. With the Garrett TFE731-2 turbofans, the C-21 has a no-wind range of over 2,000 nautical miles. There is a deeper beauty to the Learjet, though. Not only can this basically off-the-shelf executive jet get you there on time, safely and in comfort, but MAC's fleet of C-21s can double as air-evac transports. The aircraft can be reconfigured for two litter patients plus attendants in just an hour and 15 minutes. Given the operating cost of a C-9 versus a C-21 for transporting one critical patient, you can easily see why the new mini-liner is an economical alternative. In fact, the Learjet has already flown two missions in the role of super-economical air ambulance, as of this writing.

The return trip from Norton to Scott via Colorado Springs was all too short, even though it seemed like we logged 50 approaches. But that's part of the beauty of this airplane—you don't realize you're accomplishing so much while having fun.

The last of the 80 planned Learjets should be in service by October, 1985. With it, MAC will be providing fast, comfortable and economical support airlift service around the world!

Through the fog, the KAL crew found themselves...

Nose to Nose with a Piper

Due to the poor visibility, I felt unsure that the aircraft was on the correct runway. I looked for identifying markings, but could not see any. I discussed this with my copilot who felt sure that we were on the correct runway. After 3-4 minutes of discussion, I considered taking runway 6R because of my uncertainty. However, the runway size and lighting appeared to be correct, so I decided to take off."

On December 23, 1983, at 1406 Yukon Standard Time, the captain of Korean Air Lines (KAL) Flight 84 released brakes, beginning his takeoff roll down a dark, foggy Alaskan runway. The McDonnell-Douglas DC-10-30 cut through the dense vapor wall, accelerating toward rotation speed when, without warning, the crew found themselves nose-to-nose with a twin-engine Piper PA-31-350. The captain rotated the DC-10, causing the nose gear to pass over the top of the smaller aircraft and the main gear to straddle its fuselage tearing away both of the Piper's wings. The jumbo remained on the ground but was unable to stop before departing the end of the runway. It continued into a ravine and caught fire. Miraculously, no one perished in the collision, but the accident triggers this question: How, in 1983, could a fully qualified, highly experienced crew, operating one of the most sophisticated flying machines in the world, find themselves in such a position? Perhaps a review of events leading to the accident will produce a plausible answer.

According to the National Transportation Safety Board (NTSB) investigation, KAL 84 was a scheduled cargo flight from Anchorage to Los Angeles. The aircraft carried 145,260 pounds of cargo and a three-man crew. Both computed gross weight and center-of-gravity (CG) were within proper limits and the wide-bodied aircraft needed 8,150 feet of runway to complete a successful takeoff.

The KAL crew was experienced and qualified. The captain had logged over 12,500 hours, of which 6,471 were in the DC-10. The first officer was a veteran of 8,157

hours, including 3,000 DC-10 hours. The captain had flown into Anchorage for over eight years prior to the accident; the first officer for more than four. The crew was adequately rested. They received just under 30 hours crew rest prior to reporting for the flight.

The Piper involved in the collision was South Central Air (SCA) Flight 59, a scheduled domestic passenger flight from Anchorage to Kenai, Alaska. Eight passengers and one pilot were aboard. The aircraft was properly certified and also operating within gross weight and CG limits. The SCA pilot was also fully qualified and adequately rested to complete his flight.

Meteorological Information

Throughout the day, widespread, heavy fog restricted visibility from one-sixteenth to one mile. RVR fluctuated between 800 and 6,000 feet with sky conditions varying from thin to total obscuration. Fifteen minutes prior to the accident, the weather observation was: indefinite ceiling, zero feet; sky obscured; visibility, one-eighth mile, fog; runway 6R visual range, 800 variable to 1,200 feet. The NTSB paid special attention to the likely taxi route taken by KAL 84.

Sequence

At 1339, following a one-hour weather delay, SCA 59 requested taxi clearance anticipating the 1,800 feet RVR needed for takeoff. The pilot, when offered the choice of runway 6R or 6L, chose the latter and was cleared to taxi. The ground controller, unable to see taxiing aircraft because of the dense ground fog, requested a radio call when the Piper was holding short of runway 6L. At 1344, the pilot reported holding short and awaiting the 1,800 feet RVR required for takeoff (see Figure 1).

The crew of KAL 84 requested and received taxi clearance at 1357. The captain elected to depart runway 32 despite visibility below KAL's operating requirements. The ground controller asked the crew to report entering the east-west taxiway. At 1401 the crew so reported and at 1402 they called ready for takeoff. The DC-10 was then cleared into position to hold on runway 32.

At 1403, the local controller requested and received confirmation of SCA 59's position (holding short of runway 6L). He then cleared KAL 84 for takeoff on runway 32 at 1404 and at 1405 cleared SCA 59 into position to hold on runway 6L.

The KAL captain felt unsure the DC-10 was on the correct runway, and no identifying marks were visible. He discussed this with his copilot who felt certain they were on the correct runway. At one point, the captain even considered taking runway 6R due to his uncertainty of the aircraft's position. However, the runway size and lighting appeared to be correct, so at 1406 he began his takeoff roll.

Unknown to the crew, they had initiated their takeoff roll at the intersection of runway 24R and taxiway W-1 which left 2,400 feet of usable runway. A successful takeoff from that position was impossible for KAL 84.

As the jumbo approached 100 knots, the crew saw the stationary Piper materialize through the ghost-white fog, straight ahead at 15 meters. The captain rotated the DC-10

and applied left rudder causing the giant airliner to straddle the fuselage of the smaller Piper with the nose gear passing over the top of it. The Piper was pushed back 125 feet by the DC-10, losing both wings and coming to rest on its nose gear, left main gear and aft fuselage.

The DC-10, unable to stop, departed the end of runway 24R, smashed through several approach lighting towers, slewed to the right and came to rest 1,400 feet from the end of the runway, 40 feet north of extended centerline. The aircraft was destroyed by a postcrash fire. The crew egressed successfully, but all received serious injuries. Three passengers aboard the Piper received slight injuries. Fortunately, there were no fatalities.

Analysis

The restricted visibility caused the flightcrew of KAL 84 difficulty in maintaining airfield orientation during taxi. The KAL captain stated that after he started taxiing, he could see the yellow taxi lines "very dimly through the heavy ice fog." He described the visibility as "so poor that it was difficult to see the taxiway markings." The first officer stated, "It seems that I lost my sense of direction due to the heavy ice fog, and I

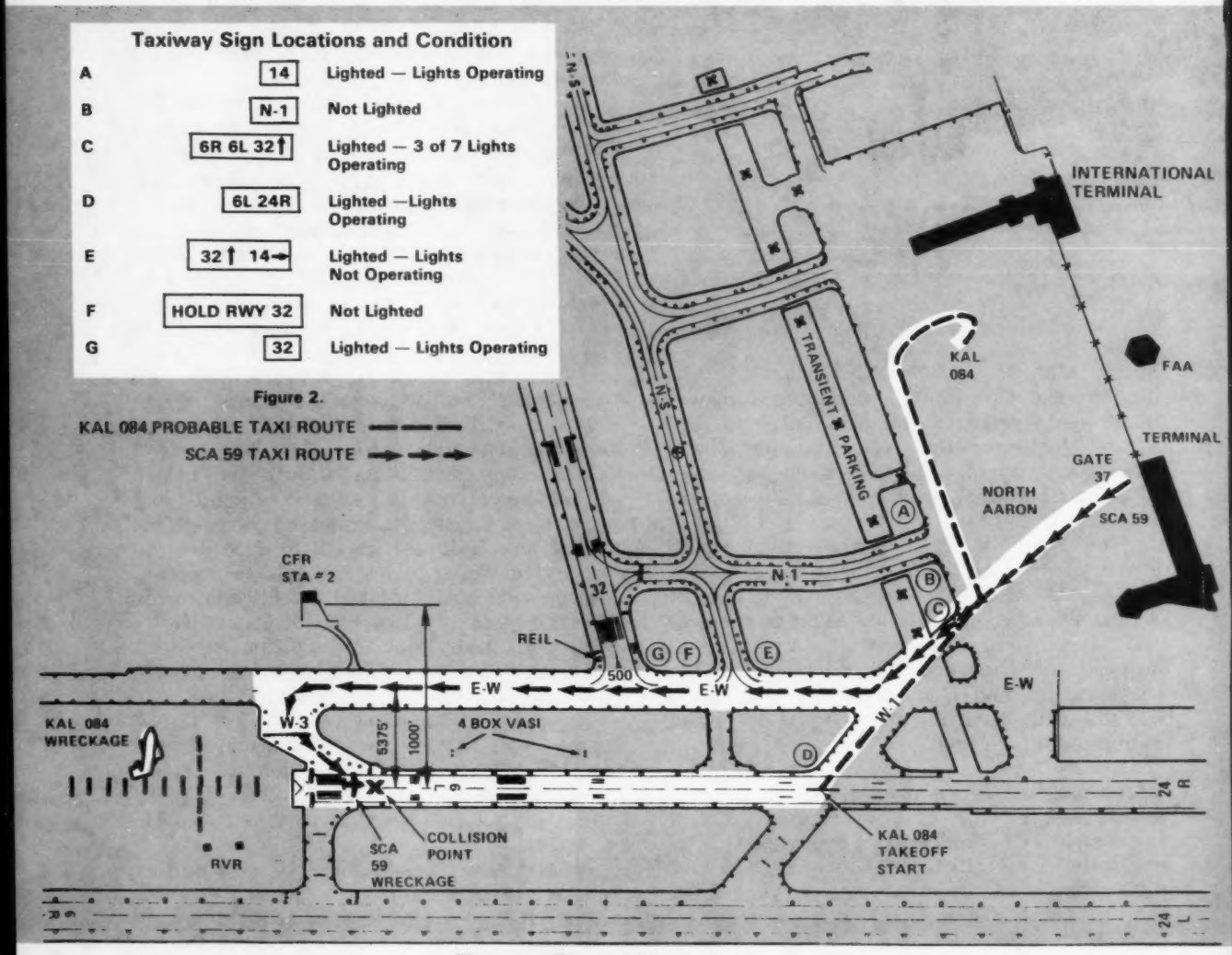


Figure 2.

Figure 1 Figure 2 Above

confused the east-west taxiway with the north-south taxiway."

The taxi route taken by KAL 84 to the intersection of runway 24R is not known and a failure of the aircraft flight recorder made the exact sequence of events difficult to confirm. However, a transcript of recorded communications between Anchorage tower controllers and the pilots of both airplanes was zero-timed to the start of KAL 84's taxi. A test aircraft used various taxi routes in an attempt to identify the most likely route taken by the DC-10. The result of these tests suggests the probable taxi route indicated in Figure 1.

Assuming the indicated taxi route is correct, KAL 84 passed four signs identifying runways and taxiways during taxi out (see Figure 2). One of the four signs, the sign designating taxiway N-1, was not lighted. This sign was not visible to the flightcrew due to the darkness and restricted visibility which existed at the time of the crash. Another of the four signs was partially lighted with only three of its seven lights operating. The crew of KAL 84 didn't indicate they saw the fully lighted sign designating runway 6L/24R.

Several factors may have contributed to the crew's failure to notice this sign. The sign was dirty, which reduced the contrast between its background and lettering. Moreover, the visibility was restricted by dense fog, which further limited the crew's ability to see the sign.

The NTSB investigators found it difficult to understand why the captain and first officer didn't use their directional gyros or the standby compass for runway confirmation, especially since the aircraft was aligned with the runway centerline when their discussion of aircraft position occurred. Had the crew referred to the aircraft compasses, it would have become readily apparent that they were on the wrong runway.

According to the investigators, failure of the crew to verify runway heading prior to takeoff may indicate a deficiency in initial or recurring KAL aircrew training. Perhaps runway verification is considered such a rudimentary procedure that specialized training is not needed.

The Safety Board concluded the first officer's strong belief about aircraft location may have influenced the captain to continue his takeoff without runway verification. The first officer's confidence in the face of the captain's uncertainties constituted a slight role reversal in that the captain's overall command authority, when deciding to take off, was influenced by the first officer's comments. In the past, the Safety Board encouraged assertiveness training for first officers, to exercise their responsibilities as part of the cockpit team; however, an additional responsibility must exist for captains to exercise positive cockpit crew management. In this instance, the crew concept broke down.

Probable Cause

The National Transportation Safety Board determined the probable causes of the accident were failure of the pilot of KAL Flight 84 to follow accepted procedures during taxi, which caused him to become disoriented while selecting the runway; failure of the pilot to use the compass to confirm his position; and the decision of the pilot to take off when he was unsure the aircraft was positioned on the correct runway. Contributing to the accident was dense fog, which reduced visibility to a point where the pilot could not determine his position visually and the control tower personnel could not assist him. The lack of legible taxiway and runway signs at several intersections also contributed to the accident.

Application to MAC

The message to MAC crews from this accident is clear. We fly world-wide, 24-hours a day in every imaginable type of weather condition. We fly into traffic-laden international airports and into remote, austere airfields. There is *no* substitute for thorough preflight planning, to include aerodrome layout familiarization, regardless of how often the field has been transited previously. Finally, the aircraft commander is, as the name implies, *the commander*, and while it's essential to be receptive to inputs from his or her well-trained, professional crew, it's equally important that if at any time there is doubt concerning the safe operation of the aircraft, the AC should discontinue the operation until that doubt is removed.

—Adapted from NTSB AAR 84-10

Andersen AFB, Guam

(elevation: 624 feet)

Andersen AFB, Guam, is located 1,400 miles east of the Republic of the Philippines and 1,300 miles southeast of Japan. Agana NAS, 10 miles to the southwest is the only other major airfield on the island. Other airfields in the area include Rota International and Saipan International located 40 miles and 105 miles north-northeast, respectively. Both airfields have limited hours of operation.

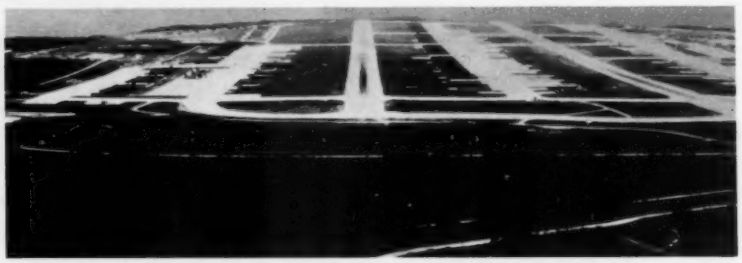
Andersen is on the northeast shore of the island and the highest terrain is located 22 miles southwest rising to 1,329 feet MSL. Several towers, two and one-half miles south of the field, reach a height of 892 feet MSL.

The base has two parallel runways, 24L/06R and 24R/-06L. Runway 24R/06L, the primary runway, is 11,200 feet long and 200 feet wide and is equipped with Medium Intensity Approach Lights, VASIs, Runway End Indentifier Lights and High Intensity Runway Lights.

The runways were constructed on uneven terrain leading to a downward slope during touchdown, regardless of the landing runway. This slope may combine with the 200 foot runway width to create a landing illusion. When landing on runway 24R, a 600 foot cliff prior to the runway threshold, coupled with the overwater approach, may lead to a dragged in approach. During takeoff, the terrain rises at a rate of over 50 feet per nautical mile!

The ramp area south of runway 06R is equipped with special security lights which are normally off; however, when activated at night during a security alert, these lights may lead to pilot distractions on short final to 06 L/R.

On short final to runway 24R. Note the cliff on the approach end which can lead to landing illusions.



On short final to runway 06L. A go-around presents little hazard.

The center taxiway at Andersen. Downslope and upslope of the runways can present significant landing illusions.

—Adapted from AQP Q6-473

C.R. TERROR

The Arctic Aeronaut ad libs an airdrop!

Windsock? Windsock!" C.R. Terror looked around for his pooch, worm pill in hand, but the Canny Canine was by now, long gone. "Why, that ingrate! See if I ever fill his bowl with 'Doggie Yum-Yums' again!" Feeling slightly miffed, C.R. was caught completely off guard by the telephone's sudden ring. Thinking he was about to be attacked, he swung around in a hand-wheeling, semi-crouching karate stance, knocking the telephone off the table and stubbing his toe in the process.

Wincing at his self-inflicted pain, C.R. managed to compose himself enough to answer the phone with his usual bravado. "C.R. Terror, here. Wars fought, computers verified, bars emptied, tigers tamed...."

"Never mind the guff, Major," roared the voice from the French provincial-style phone. "Just get yourself down to the squadron ASAP. You are *alerted*!" The voice seemed more than a little terse and the Ace of Aerospace was incensed.

"See here, my good man. You can't talk to me like that. Why, I happen to be C.R. Ter..." Once again he was cut off in mid-blither.

"I can do anything I want with your body, Terror," replied the voice. "This is Colonel Fang speaking. Remember me? Your Ops Officer?"

C.R. turned ghostly pale as a cold sweat suddenly appeared on his ample pate. "Oh, er, yes sir, sir. I understand perfectly, sir.

I'll be right...." But before he could say one more thing, Colonel Fang had slammed his phone down, nearly deafening the Maladroit Major in the process.

About two hours later, C.R. chugged into the squadron parking lot in his British-racing-green, E-type Jag. Screeching to a halt, he clambered out of the rusting hulk and dashed as fast as he could to the squadron operations building, his 1954-vintage, baby-blue B-4 bag in one hand and a rotting leather pubs bag in the other. Awaiting his arrival was one thoroughly-steamed ops officer, very mad and fit to be tied!

"Normally, I would say better late than never, Terror. But in your case," Colonel Fang continued, "I was hoping better never at all." The perturbed Colonel motioned to his office. "Let's you and I have a little chat about this mission."

C.R. literally tip-toed into Colonel Fang's office and quietly took a seat, well after the towering colonel had taken his.

"Let's get something straight right now, Terror," Colonel Fang started out matter-of-factly. "You were not my *primary* choice for this little excursion. You were not even my *last* choice for this mission. Unfortunately, you are the *only* short-field qualified aircraft commander I have who isn't Q-3, DNIF, or TDY who can go where we have to go."

"And where is that, sir?" asked the Airways Airedale.

"King Bear AFS. You know, the radar site nestled between those two..." But the ops officer didn't have a chance to finish the line before C.R. fainted dead away, still seated in his chair. King Bear was, even under the best weather conditions, a marginally safe airstrip, and C.R. had avoided the site like the proverbial plague. He was one of the few squadron pilots who could claim to have never hit a tail skid there, mainly because he'd never been there to hit one. Until now, that is.

"But sir, what mission could possibly be so important that I have to fly it?" C.R. asked somewhat recovered from his thespian-like swoon.

"Seems those radar troops have been snowbound so long, what with the extra-severe winter we're having and all, that they're going stir crazy up there, if you know what I mean." C.R. nodded knowingly. "Anyway, they've put this USO show together for those Dew-Line defenders, and you're going to fly in the entertainers. They're from Little Rock. Call themselves the 'Herkettes.'"

The Sultan of Short Fields instantly grasped the gravity of the situation, and snapped to attention. "Sir, you can depend on me. I won't fail you."

Fang leaned forward and bared the incisors which were his trademark. "You'd better not fail to get those show folk up there and back, safely and on-time, or else King Bear will be *your* next assignment."

With that, the Portly Pilot was out the door like a shot from a cannon, and heading through the falling snow towards the last C-130 on the ramp at Elmerson. Luckily, Long Suffering Sam and Blinky, C.R.'s copilot and navigator, had already completed the flight planning. Along with Max Torque and Ty Downs, and 14 charming entertainers, they were impatiently waiting the arrival of their mentor. Surprisingly, the Ample Aeronaut managed to leap aboard the Herk and into his seat in one smooth, gliding motion—due in no small part, to the liberal coating of ice on his mukluks!

"Uh, Boss," Sam spoke up as the Turboprop Titan was about to turn over number three. "We're starting to accumulate a lot of snow on the wings. Shouldn't we let the deicing trucks clean us off before we go?"

"Deice? You expect me to delay engine start for a couple of snow flakes, Sam?" C.R. chastised the stalwart second-seater. "Nonsense! The show must go on and we're already five minutes late for engine start. Loadmaster, clear number three engine!" And with that, C.R. soon had all four engines on speed. After the briefest of briefings and run-ups, the green-and-gray Herk was soon lumbering down the snow-covered runway, on time and on schedule. The Herk, however, wasn't accelerating normally and Sammy, Blinky and Max noticed it immediately.

"Reject, Boss," Sammy yelled. "We don't have enough lift with all that snow on the wings! We'll never make it off the ground!"

"Horsefeathers, Sammy," the Titan of the Tundra thundered. "What's with a little light snow? It'll blow off the wings before we reach 100 knots. Press on!"

"But, Boss," Max yelled excitedly. "That light snow

sticks to the residual deicing fluid and water. It'll never blow off! *Reject!"*

The Miffed Major ignored the pleas and warnings of his crew, though, and simply pushed the throttles forward another inch or two. "I said we're going, and we're going! If I don't get this heap airborne on time, Colonel Fang will have my tail!"

Seeing the overrun rapidly approaching, the Kodiak Klutz grabbed the yoke with both pudgy hands and pulled. The overburdened Herk shuddered and shook, then struggled into the air, all four turboprobs straining to the limit.

"Gear up!" C.R. screamed as the Lockheed Legend wallowed through the air. "Max, give me more power." Finally, he recognized the true gravity of his ill-advised takeoff.

"Boss, ya gotta pull 'em back!" Max's voice boomed over interphone. "I show 23,000 pounds of torque on all four. If you don't reduce power a little, those Allisons will twist right off the wing!"

"Can't...reduce...power!" C.R. stammered as he fought to avoid a stall. "We're hangin' on the props as is. Max, dump fuel. Ty, get ready to jettison cargo! If we don't get some airspeed and altitude, we're history!!!"

Luckily, C.R.'s crew maintained their composure and professionalism and were quickly ready to jettison the cargo. "Loadmaster's ready to drop, Boss," Ty interjected on interphone. "But be advised the first pallet to go has all the costumes and equipment for the show!"

To his credit, C.R. never hesitated. "Drop all three pallets, load," he barked. "We'll worry about the contents later."

Moments later, three standard Air Force pallets exited the back of the Herk, disappearing into the snow-covered forest below. Slowly, the ice-covered turboprop began to accelerate and climb.

"Whew!" the Crestfallen Commander managed to croak. "That was really close. Everybody OK?" His belated concern for the safety of his crew and passengers produced only sullen grunts on the interphone.

"Pilot, these dancers are freezing to death back here. It must be 20 below. We need to get them on the ground and into some warmer clothes ASAP!" Ty Downs sounded very upset—and very cold.

"Right you are, Ty," C.R. mumbled morosely, remembering Colonel Fang's parting promise. "Get approach on the horn, declare an emergency, and get a warm bus on the way for our passengers."

Thirty minutes later, C.R. guided the over-torqued Herk to a safe landing on a now completely snow-covered runway. He groaned as he noticed the long line of rescue vehicles, ambulances, buses and staff cars waiting ominously at the end of the runway. "Sammy, I think this is it. My career is over! Colonel Fang is going to have me PCS to King Bear AFS by noon tomorrow!" Tears began to dribble down his pale cheeks.

"Not exactly, Boss," Sammy answered as he took control of the aircraft. "After I called in our emergency to command post, Colonel Fang gave me a message to pass on after landing."

"Tell Terror to dress warmly. He's gonna be driving a dog sled through the arctic 'till he finds those pallets. *Then* he's going to King Bear—*permanently*." ✭

Quick Stoppers

It can Happen to Anyone..!

Yes sir, folks, we're living in the age of nearly complete automation. But incidents *will* happen, won't they? As in the case of an atypical four-engined trash hauling airlifter. "Armed" to the teeth with both dual INS *and* a navigator, there was nothing to fear while crossing the dreaded NATS—the North Atlantic Tracks System. Ahem! Then why, do you ask, was said stalwart crew reported by Shanwick as being *more* than 20 miles off course when they coasted in? Appears that sometime during the overwater part of the mission, the autopilot disengaged itself from the INSs. No one on the crew—neither the pilots nor the *two* navigators—noticed when this happened, and therein lies the problem. Seems basic inattention by the pilots and the navigators was the real cause of this course deviation. Good thing this little incident didn't happen over the North *Pacific* instead of the North *Atlantic*.

In-Ground Effect

Flying in Europe is different, and we've said that more than once. Take the crew of one HH-53 delivering the helo to a German aircraft firm for an analytical condition inspection. After an uneventful approach and landing by the copilot, he turned onto the taxiway leading to the parking spot. The kicker here is that the taxiways at this facility are much narrower than USAF and USAFE crews are used to—only 8 meters wide, or roughly 25 feet. Taxiing to the parking spot required a 90° right turn followed almost immediately by a 90° left turn. Approaching the 90° right turn, the copilot moved the heavy helo to the right of the centerline in an attempt to cut the corner and decrease the turn angle. He was clearing forward and left (remember, the copilot sits on the left in a helicopter), while the AC was clearing forward and looking for vehicles on the parallel taxiway. Both pilots were so concerned with the tight parking spot, they channelized their attention on the spot and *not* on the corner-cutting turn. Result: Neither pilot was aware that the right gear had departed the taxiway. Some ground personnel had seen the incident, however, and told the crew about their off-taxiway excursion when the Jolly Green pulled into parking. In fact, the '53's right main gear had departed the taxiway by some *four* feet. The ensuing postflight inspection revealed a broken brake check valve and a crushed taxiway light.

A Real Gone Goose

In the local pattern, a C-5 and its crew were involved in the routine of normal continuation training. Ho hum. Just after one touch-and-go landing, though, the MADAR indicated an abnormal vibration in the number-one engine. About ten minutes later, the vibration became excessive, so the crew shut down the errant engine IAW the Dash-One. Inspecting the gimpy Galaxy after landing, the maintenance troops found evidence of a bird strike—tell-tale blood and feathers in the number-one engine. Specifically, a Canadian goose which hadn't been detected by the crew or the local bird-finding radar, had picked a fight with the wrong thing, though it was hard to tell who was the winner. Damage to the engine was minimal, as damage to engines goes, with only three inner vanes and three mid-inner spacers broken to the tune of just over $8,200! The goose, or more specifically, what was *left* of the goose, was cooked.

Where There's Fire, There's Smoke—Maybe

The Starlifter and crew had just departed for a return flight to the old homedrome, and the crew was busy, as usual, with the after takeoff checks. Returning to the front of the cargo compartment after completing his walkaround, the loadmaster noticed some strange odors, apparently electrical in origin. He called for the engineer to come down and lend his trained olfactory senses in the hunt for the mysterious fumes. Well, sir, by the time the FE arrived, the smells were so strong, a blind hound dog could have "seen" 'em. Still, there was no tell-tale smoke to give the crew a clue on what was burning—or where. Anyway, the AC ordered the crew on oxygen, declared an IFE, and turned the Starlifter around. Meanwhile, the loadmaster who had originally "sniffed out" the fumes and who had also been exposed to their acrid presence the longest, felt a burning sensation in his nose and throat, and experienced some tingling in his hands. After a few minutes on O_2, however, all of these feelings stopped. Still, the loadmaster was taken to the hospital, given a thorough once-over by the flight surgeon, and released for duty with no lingering effects. The cause of the fire, by the way, was a short in the transformer in the IFF power supply module.

The Old Triple Whammy!

Enroute to a sunny Florida destination, the crew of the old CT-39 was cleared to FL250. A positive needle split on the cabin pressure altimeter indicated the pressurization system was functioning normally. Passing FL210, however, both pilots noticed symptoms of hypoxia—nausea and dizziness. They cross-checked the cabin altimeter and were shocked to see it indicated 21,000 feet! Both pilots immediately went on oxygen, and the AC declared an IFE and a physiological incident. They began an immediate descent to 10,000 feet, and manually deployed the passenger oxygen masks which, by the way, had failed to automatically deploy. Fortunately, the crew and pax returned uneventfully to the departure base. But what caused an unnoticed and sudden climb in the cabin altitude?

Well, it was the old "triple whammy!" First of all, the cabin pressure safety valve became partially stuck open, resulting in a loss of pressurization. Then, the cabin pressure baroswitch didn't illuminate the cabin pressure warning light on the annunciator panel when the cabin altitude exceeded 10,000 feet. Finally, the cabin oxygen pressure switch didn't deploy the O_2 masks automatically when the cabin pressure altitude exceeded 10,000 feet. Wham, wham...*wham*!

Low-Strung Wire Strike

Following an uneventful flight on a range support mission to drop off some range control officers, the crew of the TH-1F was scheduled to continue to another remote data collection site, pick up some electronic tapes, and then RTB. Because the entire route was to be flown within a heavily-transitted weapons delivery range, the standard flight procedures called for the helos to move through the range below the path of the "fast movers" at some 100 to 200 feet AGL. With the tape now safely aboard, the crew began their return flight. At approximately 80 knots and 125 feet AGL, the Huey struck two 12-gauge, uninsulated wires strung between a small, remote dwelling and a 500-foot hill. The pilot and flight engineer saw the wires at the time of contact, and the pilot immediately began a minimum-power descent. The wire-struck Huey landed about 4,000 feet past the impact point in an open area, where the crew then inspected the aircraft for any damage. The right windscreen had one 18-inch crack with some crazing, and the left windscreen "escaped" with only some light abrasions. Total cost estimate to repair the damage was in excess of $1,500!

After Deadlines

LOCKHEED C-130Hs DELIVERED TO N.Y. GUARD—The 109 TAG, New York Air National Guard, is sporting a new look these days. Replacing the unit's 24-year-old C-130Ds are brand new C-130Hs. Three of the new "European 1" camouflaged Herks have already been delivered with five more to come. Four of the remaining five aircraft to be delivered will be LC-130Hs, the latest ski-equipped Hercules model. This is in keeping with the 109 TAG's primary assignment of DEW Line resupply—hauling food, fuel, and other vital supplies to the Greenland radar sites that can be reached only by air. All eight aircraft will be used for regular ANG airlift missions and, in time of national emergency, would become part of MAC's tactical airlift force.

FIRST C-23A SHERPA DELIVERED—Following ceremonies at Short Brothers, Ltd., in Belfast, Northern Ireland, the first C-23A Sherpa was flown to its home base at Zweibrucken AB, West Germany. Operated by MAC's 10 MAS, the Sherpa will be used to ferry spare parts and engines as needed throughout the European theater. The remaining 17 aircraft will be delivered within the next 10 months. Shown here is the crew of the first Sherpa. From left to right: Maj. John Jackson, Maj. Carl Rubner, and SSgt. Zuriel Armstrong. (Photo courtesy of Short Brothers, Ltd.)

FIRST C-5A DELIVERED TO "ALAMO WING"—Gen. Thomas M. Ryan, Jr., CINCMAC, personally delivered the first Lockheed C-5A Galaxy to the Air Force Reserve in ceremonies at Kelly AFB, Texas, on 1 December. General Ryan handed over a symbolic key to Maj. Gen. Sloan R. Gill, AFRES commander, who accepted the aircraft.

☆ U.S. GOVERNMENT PRINTING OFFICE: 764-016/10

THE MAC Flyer

Do you have latent supervisory tendencies? Ever get the urge to tell a story with a mishap prevention punch line? Be embarrassed no more!! These same personality quirks can now actually be considered strengths. That's right! If you are ambitious and can tell a good story, are a relatively new or underutilized major with MAC strategic airlift experience, you are what MAC's flight safety journal needs. We'll have an opening in the May-June 1985 time frame for a supervising editor. Flight safety and/or public affairs experience is a plus. Also helpful is the ability to control and direct the energy of two junior editors. Interested officers should contact Major Jim Lee, Supervising Editor, Autovon 638-5542, or write HQ MAC/IGFE, Scott AFB, Il. 62225-5101.